

**LESTES SECULA, A NEW SPECIES OF DAMSELFLY
(ODONATA: ZYGOPTERA: LESTIDAE) FROM PANAMA**

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Abstract.—The new species most closely resembles *Lestes tenuatus*, *L. pictus*, and *L. henschawii*, but it is distinctive in color pattern, in the form of the male cerci, and in the form of the ovipositor. Brief notes on its ecology and probable relationships, as well as a key to regional species, are provided.

Resumen.—La nueva especie se parece a *Lestes tenuatus*, *L. pictus*, y *L. henschawii*, pero es distintiva en su coloración y en la forma de los cercos del macho y del ovipositor. Se provee, además, breves notas acerca de sus ecología y probables relaciones específicas, así como una clave para identificar las especies de la región.

Key Words: Central America, *Lestes*, neotropical fauna, Panama, Zygoptera

The Zygoptera of the Neotropics, although better studied than most tropical insects, are still poorly known. Merely to catalog the diversity of that region is a monumental task facing biologists over the next decades. What follows is intended as a small contribution to that effort.

The genus *Lestes* is cosmopolitan, and one of the largest zygopteran genera; 88 species are recognized by Tsuda (1991), 23 of which are Neotropical. *Lestes* has not been treated comprehensively, but Calvert (1901-1908, 1909) and Kennedy (1942) clearly illustrated diagnostic features for males of many species. Comparison with descriptions and/or authoritatively identified specimens of all the regional species confirm that the species described here is new.

TERMINOLOGY AND METHODS

Terminology for the caudal appendages follows Snodgrass (1954), for the penis Miller and Miller (1981), and for the wing veins Tillyard and Fraser (1938-1940).

All measurements are in mm and were made with a ruler (to 0.5 mm) or a filar micrometer (to 0.1 or 0.01 mm). Total length and abdomen length include the cerci. Cerci and paraprocts were measured in lateral view from about mid-height of each (not from a common point) to its tip. Ovipositor lengths exclude the styli. Illustrations were modified from sketches made using a Wild stereo microscope equipped with a camera lucida and/or tracings of electron micrographs made with an Hitachi S-510 scanning electron microscope. Specimens are preserved dry in transparent envelopes unless otherwise noted.

Collections referred to are abbreviated as follows: FSCA—Florida State Collection of Arthropods (Gainesville); IORI—International Odonata Research Institute (Gainesville); MLM—personal collection of M. L. May (New Brunswick); MCZ—Museum of Comparative Zoology (Cambridge, MA).

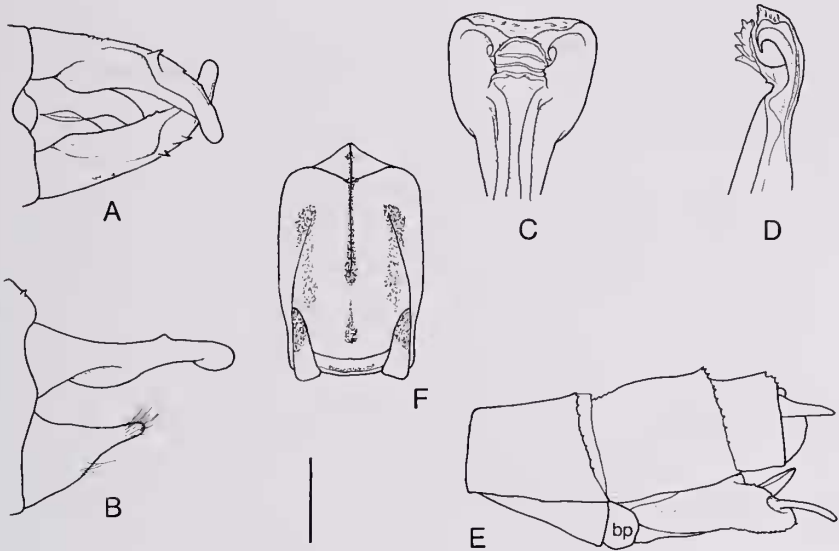


Fig. 1. *Lestes secula* spec. nov. A—male caudal appendages, dorsal view; B—male caudal appendages, lateral view, right appendages omitted; C—head and distal shaft of penis, ventral view; D—head and distal shaft of penis, lateral view; E—apex of female abdomen, lateral view (bp—basal plate of ovipositor); F—diagram of color pattern on ventral metathorax. Scale bar = 0.5 mm for A, B; 0.3 mm for C, D; 1.0 mm for E.

Lestes secula, new species

Fig. 1A–F

Material examined.—Holotype: ♂ (#1), Panama, Area del Canal, Barro Colorado Island, seasonal pond at Standley Trail marker 5, 28 March 1974, coll. by M. L. May, IORI. Allotype: ♀ (#2), same data as holotype except 19 January 1974. Paratypes: 1 ♂ (#3), Panama, Prov. Panama, Pacora, 24 December 1950, coll. by R. B. Cumming, FSCA; 1 ♂ (#4), 1 ♀ (#5), same data as holotype except 9 Feb. 1972, teneral specimens preserved in alcohol, MLM; 1 ♂ (#6), 2 ♀ (#'s 7, 8), same data as holotype except collected as larvae on 15 September 1974 (♂ emerged 22 Sept., ♀'s emerged 20 and 23 Sept.), preserved in alcohol, FSCA.

Etymology.—*Secula* is the Latin noun for sickle, or scythe, referring to the shape of the male cerci.

Diagnosis.—A species of moderate size and stature, dark and not strongly metallic or pruinose; the posterior surface of the head is mostly black, the medial mesepisternal dark stripe at least ½ width of that sclerite, and distinct dark markings are present above and below the metapleural carinae and on the thoracic venter (Fig. 1F). The shape of the male cerci is unique; the paraprocts are unusually short and stout (Fig. 1A, B). The ventral margin of the ovipositor is distinctly concave and the basal plate rounded (Fig. 1E).

Males of *L. secula* resemble *L. tenuatus* in the form of their paraprocts and in size

and general coloration but are usually darker insects with wider and less brightly metallic mesepisternal stripes (dark thoracic areas of some old male *L. tenuatus* may be as extensive as in *L. secula*, however), a more extensive dark pattern on the metathoracic venter, and the rear of the head dark. They ordinarily are easily distinguished by the absence of a basal tooth along the medial margin of the cerci, although this tooth may occasionally be blunt and lobe-like in *L. tenuatus* (Johnson, 1975). Females are very similar to *L. tenuatus* in the form of the ovipositor and the slightly flavescent wings but are stockier (in *L. tenuatus* abdominal segment 3 is at least 6 times as long as its height at midlength) and differ in the same color characters.

Both sexes of *L. secula* also are somewhat like *L. henschawi*, a species not recorded from Panama but expected to occur (Tsuda, 1991). *Lestes henschawi* is an appreciably larger species, however (hindwing longer than 25 mm, abdomen longer than 36 mm in males, 33 mm in females), with the pronotum largely black, black areas of the pterothorax lacking greenish reflections, and pale areas of the pterothorax contrasting sharply with the black and apparently not becoming brown and obscure. Like *L. tenuatus*, male *L. henschawi* have a distinct basal tooth on the inner edge of the cerci. The ovipositor of female *L. henschawi* resembles both *L. secula* and *L. tenuatus* in having a rounded basal plate but differs from both those species in that the ventral margins of the third valvulae are nearly straight, not distinctly concave.

The absence, as in *L. secula*, of a basal cercal tooth is uncommon among male *Lestes* and mostly occurs in species with a distinct declivity toward the apex of the cerci. An exception is *L. pictus* Hagen in Selys. In this South American species, however, the medial shelf of each cercus is wider apically (Calvert, 1909; Muzon, pers. comm., 1991) than in *L. secula*, and in the male syntype (which now lacks its terminal abdominal segments; pers. obs., 1988) the rear of the head is pale, and the dorsum of abdominal segment 2 has a wider, triangular pale stripe. The female syntype also has the rear of the head pale and the ventral margin of the ovipositor straight; a female in the Carnegie Museum (Pittsburgh, PA) has the ovipositor barely concave, with the basal plate right-angulate.

Holotype.—Abdomen broken between segments 4 and 5, both hind tarsi broken off, subapical tear in both forewings.

Head with labrum light blue with narrow brown margin and small mediobasal spot. Genae and outer surface of mandible ivory with slight bluish cast. Clypeus broadly brown along clypeolabral and epistomal sutures, black between. Antefrons brown ventrally, becoming black above; remainder of epicranium black with slight metallic greenish reflections except for small brown areas just lateral to lateral ocelli and on occipital ridge. Antennae black to dark brown with tan anterior stripe on 2 basal segments, ocelli brown, eyes grey (probably bluish in life). Rear of head black except small yellowish central area, mouthparts tan with apexes of mandibles and maxillae black.

Prothorax brown with small, geminate black spot on middle lobe; slightly pruinose dorsally, heavily so on pleura. Pterothorax with middorsal carina and narrow flanking stripes, antealar ridge and sinus, and tergal sclerites brown. Mesepisterna each with black stripe, showing metallic greenish reflections, extending their full length and gradually widening from about $\frac{1}{2}$ width of sclerite anteriorly to $\frac{2}{3}$ width at posterior end. Laterally and ventrally, thorax largely brown, slightly darker on center of mesepimeron, yellowish tan on ventral mesinfraepisternum, anterior metepisternum, lateral

metepimeron, and venter; pattern of dark ventral and ventrolateral markings like Figure 1F but nearly obscured along midline by pruinosity. Also heavily pruinose on coxae and anterior tergal sclerites, lightly so along metapleural and interpleural sutures. Legs tan, brown on extensor surfaces of femora, black on internal and external angles and distal ends of femora, flexor surfaces of tibiae, and most of tarsi. Wings hyaline, veins and pterostigmata black to dark brown.

Abdomen with terga of segments 1–8 black with slight metallic greenish reflections dorsally except grey on basal $\frac{1}{3}$ and distal $\frac{1}{6}$ of segment 1, tan along diffuse, narrow median line on 2, extremely narrow hairline on 3 and 4, and narrow, medially interrupted basal rings on 3–8. Tergites tan ventrolaterally except for black apical annulus on each and black ventral margin of 1, marginal spot of 2, and edges of hamules. Segments 9 and 10 dark red-brown, dorsal apex of 10 black; caudal appendages mostly black. Sternum of segment 1 tan with median black stripe, 2–7 black, 8 and 9 each brown with median black line. Third abdominal segment 10 times as long as its height at midlength, 2.5 times as long as segment 2. Cerci 1.12 mm, lacking prominent teeth along medial edges, each with shelf-like medial dilation along distal $\frac{4}{5}$ that is widest near base and gradually tapers to apex; paraprocts 0.66 mm, slightly upcurved, with terminal tuft of setae (Fig. 1A, B). Penis not extruded but presumably as in Figure 1C, D.

Measurements: Total length—37.0, abdomen—29.0, hindwing—21.0.

Allotype.—Left prothoracic leg broken at trochanter, abdominal segment 9 indented dorsally.

Head and prothorax as in holotype except labrum dull, dark grey. Pterothorax with mesepisternum similar to holotype but middorsal carina darker and less distinct from black stripe, antealar ridge and sinus dark. Mesepimeron dark brown with black streak about $\frac{2}{3}$ its width along central $\frac{3}{5}$. Mesinfraepisternum black on dorsal $\frac{1}{2}$, yellowish ventrad. Metapleura and venter yellowish-tan with dark line along each metapleural sulcus and along anterodorsal margins of metinfraepisternum. Dark markings of venter similar to holotype but much less obscured by pruinosity. Legs and wings as in holotype except wing membranes faintly flavescent.

Abdominal segments 1–7 marked much as in holotype but dark areas generally more extensive. Pale ventrolateral areas of segments 1 and 2 with distinct greenish-grey tint, those of 3–7 darker than in holotype. Segments 8–10 entirely dark brown to black except small, ventrolateral tan markings on 8. Third abdominal segment 5 times as long as its height at midlength, 2.1 times as long as segment 2. Ovipositor 2.25 mm, with ventral margin of valvula 3 distinctly concave near midlength, basal plate rounded (Fig. 1E).

Measurements: Total length—37.5, abdomen—29.5, hindwing—22.0.

Variation among paratypes.—Male from Pacora like holotype except generally darker, hence probably older. Postclypeus entirely dark. Pterothorax marked as in allotype except lateral dark areas more extensive and ventrolateral margins darker; venter with less pruinosity, more extensive dark marking than holotype. Abdomen with middorsal lines obsolete, lateral areas of segment 1 entirely margined with black. Penis shown in Figure 1C, D. Total length—38.0, abdomen—30.0, hindwing—22.0.

The teneral and reared specimens, in alcohol, have very faintly developed color patterns. They appear similar to those of the holotype and allotype, except with the mesepisternal dark stripe slightly narrower, probably a function of age. Structurally

they seem identical. Measurements are not given because of the probability of distortion of the soft cuticle.

Notes.—Like many *Lestes*, this species inhabits seasonal ponds with abundant bottom litter and no fish. The type locality is typically dry from about February to May or June. It is in old-growth, seasonal moist forest, receives sunlight only intermittently except at midday, and has little or no rooted aquatic vegetation. Seemingly mature *L. secula* could be found throughout most of the year, but I observed reproductive activity only during the wet season. Possibly this species, like a number of other tropical dragonflies, passes the dry season in adult diapause. Other Odonata collected at the type locality included *Miocora peraltica* Calvert (probably not breeding), *Metaleptobasis westfalli* Cumming, *Neoerythromma cultellatum* (Selys), *Gynacantha gracilis* (Burmeister), *G. tibiata* Karsch, *Triacanthagyna satyrus* (Martin), *Anatya normalis* Calvert, *Cannaphila insularis* Kirby, *Erythrodiplax fervida* (Erichson), *Micrathyria atra* (Martin), and *Perithemis mooma* Kirby. In Panama, *L. tenuatus* Rambur is common in similar habitats but was not collected with *L. secula*.

KEYS TO *LESTES* OF MEXICO AND CENTRAL AMERICA

The following should permit identification of adults of all the species known from Mesoamerica. The validity of *L. simplex* as distinct from *L. alacer* was questioned by Johnson (1972) and remains unresolved; the couplet separating these two is taken almost directly from Johnson's key. The female of *L. simplex* is undescribed. The Antillean species, *Lestes scalaris* Gundlach, was reported from this area by Dunkle (1990), possibly because of its close similarity to *L. tikalus* Kormondy; although I, too, am uncertain that the latter is distinct, I provisionally retain the name *tikalus* for the mainland populations.

Males

- | | | |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1 | Paraprocts sigmoid, their tips diverging | <i>sigma</i> |
| 1' | Paraprocts not sigmoid, their tips parallel or converging | 2 |
| 2(1') | Cerci, in dorsal view, scythe-like, their medial margins without large teeth (Fig. 1A) | <i>secula</i> |
| 2' | Cerci not so, their medial margins with at least one prominent tooth | 3 |
| 3(2') | Paraprocts barely more than ½ length of cerci, or less | 4 |
| 3' | Paraprocts distinctly more than ½ (typically more than ⅔) length of cerci | 5 |
| 4(3) | Femora and posterior surface of head mostly yellow to yellow brown (head darkens with age); mesepisterna each with metallic green stripe, not contiguous with middorsal carina (middorsal area may become dark brown) | <i>tenuatus</i> |
| 4' | Femora and posterior surface of head mostly black; mesepisterna each with uniformly black stripe, contiguous with middorsal carina | <i>henshawii</i> |
| 5(3') | Cerci, in dorsal view, with distinct subapical, medial tooth in addition to similar basal tooth; metallic green mesepisternal stripe abruptly widened posteriorly ... | <i>tikalus</i> |
| 5' | Cerci, in dorsal view, with basal, medial tooth only, usually followed by more or less serrated margin; mesepisternal stripe uniform in width or only slightly and gradually widened posteriorly | 6 |
| 6(5') | Mesepisterna each with narrow, metallic green stripe, not contiguous with middorsal carina, paraprocts nearly as long as cerci, extending well beyond posterior limit of medial dilation of latter | <i>forficula</i> |
| 6' | Mesepisterna each with broad black stripe, contiguous with middorsal carina; par- | |

- aprocts not more than $\frac{3}{4}$ as long as cerci, extending little, if at all, beyond posterior limit of medial dilation of latter 7
- 7(6') Cerci, in dorsal view, with medial serrated dilation a well-developed lobe terminated posteriorly by a distinct notch; paraprocts not distinctly curved inward *alacer*
- 7' Cerci, in dorsal view, with medial serrated dilation less prominent, not terminating posteriorly in a distinct notch; paraprocts distinctly curved or slanted inward . . . *simplex*

Females

- 1 Basal plate of ovipositor rounded at posteroventral margin; ventral margin of valvula 3 of ovipositor often with distinct concavity (Fig. 1E; not so in *L. henshawi*) 2
- 1' Basal plate of ovipositor with posteroventral corner acutely angulate, often with an acute tooth; ventral margin of valvula 3 of ovipositor nearly straight to convex throughout 4
- 2(1) Posterior surface of head yellow or yellow brown; thoracic venter without dark streak along metapleural carina; length of abdominal segment 3 about 6 times its height at midlength *tenuatus*
- 2' Posterior surface of head black; thoracic venter with dark streak just ventromedial to metapleural carina, in addition to dark anterior and posterior spots adjacent to carina (Fig. 1F); length of abdominal segment 3 about 5 times its height at midlength 3
- 3(2') Ventral margin of valvula 3 of ovipositor with distinct concavity; pale stripes of mesothorax often not sharply demarked and dark mesepimeral stripes either much shorter than mesepimeron or largely brownish and obscure; pronotum not black; hindwing shorter than 25 mm *secula*
- 3' Ventral margin of valvula 3 of ovipositor nearly straight; pale stripes of mesothorax sharply demarked and dark mesepimeral stripes black and extending almost full length of mesepimeron; pronotum largely black; hindwing usually longer than 25 mm *henshawi*
- 4(1') Mesepisterna with distinctly metallic green stripes or spots 4
- 3' Mesepisterna without metallic green areas, dark areas black, sometimes with bronze reflections 5
- 4(3) Mesepisternal stripe usually wider than 0.3 mm at narrowest point, abruptly expanded posteriorly; metallic green mesepimeral stripe, if present, wedge-shaped, widest anteriorly *tikalus*
- 4' Mesepisternal stripe usually narrower than 0.3 mm at narrowest point, only slightly and gradually widened posteriorly; metallic green mesepimeral stripe, if present, linear *forficula*
- 5(3') Mesepisterna and mesepimera with dark spots or streaks extending much less than length of each sclerite or, in old specimens, entire mesothorax becoming dark and heavily pruinose *sigma*
- 5' Mesepisterna and mesepimera with complete, dark stripes extending nearly full length of respective sclerites, this pattern never entirely obscured *alacer*

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LITERATURE CITED

- Calvert, P. P. 1901-1908. Neuroptera. Odonata. *In*: F. D. Godman and O. Salvin (eds.), *Biologia Centrali Americani*. Porter and Dulau, London.
- Calvert, P. P. 1909. Contributions to a knowledge of the Odonata of the Neotropical region, exclusive of Mexico and Central America. *Ann. Carnegie Mus.* 6:73-280.
- Dunkle, S. W. 1990. Damselflies of Florida, Bermuda, and the Bahamas. Scientific Publishers, Gainesville, FL.
- Johnson, C. 1972. The damselflies (Zygoptera) of Texas. *Bull. Florida State Mus.* 16:55-128.
- Johnson, C. 1975. Variability in the damselfly, *Lestes sigma* Calvert (Zygoptera: Lestidae). *Texas J. Sci.* 26:165-169.
- Kennedy, C. H. 1942. *Lestes henshawi*, Ecuador, L. urubamba, Peru, and notes on other South American *Lestes* (Lestidae: Odonata). *Rev. Ent.* 13:274-290.
- Miller, P. L. and C. A. Miller. 1981. Field observations on copulatory behavior in Zygoptera, with an examination of the structure and activity of the male genitalia. *Odonatologica* 10:201-218.
- Snodgrass, R. E. 1954. The dragonfly larva. *Smith. Misc. Coll.* 123:1-38.
- Tillyard, R. J. and F. C. Fraser. 1938-1940. A reclassification of the order Odonata based on some new interpretations of the venation of the dragonfly wing. *Austr. Zool.* 9:125-169, 195-221, 359-390.
- Tsuda, S. 1991. A Distributional List of World Odonata. Osaka.

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